

Applicant : Hubert Köster et al.
 Serial No. : 09/067,337
 Filed : April 27, 1998
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 Amendment and Response

Attorney's Docket No.: 17111-002001
 (2301)

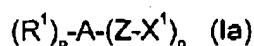
Amendments to the Claims:

Claims 5, 33 and 45 are amended.

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

5. (Currently amended) A liquid phase carrier (LPC) that has formula (Ia):



wherein: A is silicon; R^1 is hydrogen, alkyl, aryl, aralkyl, heteroaryl, heteroaralkyl, heterocyclyl or heterocyclylalkyl; p is 0 or 1; Z is any combination of 1-12 units selected from 1,2-, 1,3- or 1,4-phenylene and alkylene units, which units may be combined in any order; X^1 is ~~any reactive group which can be used in biopolymer synthesis~~ any reactive group that effects biosynthesis of biopolymers; n is 3 or 4; with the proviso that if Z is methylene, then Z contains more than three methylene units; R^1 , X^1 , and Z are unsubstituted or substituted with one or more substituents each independently selected from Q; and Q is halogen, hydroxy, nitrile, nitro, formyl, mercapto, carboxy, alkyl, haloalkyl, polyhaloalkyl, aminoalkyl, diaminoalkyl, alkenyl containing 1 to 2 double bonds, alkynyl containing 1 to 2 triple bonds, cycloalkyl, cycloalkylalkyl, aryl, heteroaryl, arylalkyl, heteroarylalkyl, alkylidene, arylalkylidene, alkylcarbonyl, arylcarbonyl, heteroarylcarbonyl, alkoxycarbonyl, alkoxycarbonylalkyl, aryloxy, aryloxy, aryloxy, aryloxy, aryloxy, aryloxy, aminocarbonyl, alkylaminocarbonyl, dialkylaminocarbonyl, arylaminocarbonyl, diarylaminocarbonyl, arylalkylaminocarbonyl, alkoxy, aryloxy, perfluoroalkoxy, alkenyloxy, alkynyloxy, arylalkoxy, amino, aminoalkyl, alkylaminoalkyl, dialkylaminoalkyl, arylaminoalkyl, diarylaminoalkyl, alkylamino, dialkylamino, arylamino, diarylamino, alkylaryl amino, alkylcarbonylamino, alkoxycarbonylamino, arylcarbonylamino, aryloxy, aryloxy, aryloxy, aryloxy, aryloxy, aryloxy, azido, alkylthio, arylthio, perfluoroalkylthio, thiocyno, isothiocyano, alkylsulfinyl, alkylsulfonyl, arylsulfinyl, arylsulfonyl, aminosulfonyl, alkylaminosulfonyl, dialkylaminosulfonyl, arylaminosulfonyl or diarylaminosulfonyl.

6. (Previously presented) The LPC of claim 5, wherein: X^1 is OH, SH, NH_2 , COR^5 or $COOR^4$, where R^4 is selected from hydrogen, alkyl, aryl, aralkyl, heteroaryl, heteroaralkyl, heterocyclyl and heterocyclylalkyl; and R^5 is halide, heteroaryl or pseudohalide.

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7. (Previously presented) The LPC of claim 5, wherein Z is a group with three or more points of attachment: one to A, and the others to two or more X^1 groups.

11. (Previously presented) The LPC of claim 5, wherein p is 0 and n is 4.

12. (Previously presented)) The LPC of claim 5, wherein Z is any combination of 1-12 units selected from 1,4-phenylene and methylene, which units may be combined in any order, with the proviso that if Z is methylene, then Z contains more than three methylene units.

13. (Previously presented) The LPC of claim 5, wherein Z is C_{1-12} alkylene, with the proviso that if Z is methylene, then Z contains more than three methylene units.

14. (Previously presented) The LPC of claim 5, wherein X^1 is OH, SH or NH_2 .

15. (Previously presented) The LPC of claim 14, wherein X^1 is OH.

16. (Previously presented) The LPC of claim 14, wherein X^1 is NH_2 .

29. (Previously presented) The LPC of claim 5 that is coupled to a photocleavable linker.

33. (Currently amended) A method of solution phase biopolymer synthesis, comprising the steps of:

(a) reacting an LPC of formula $(R^1)_p-A-(Z_t-X^1)_n$ with a first monomer N^1 ;

(b) separating and purifying the product of step (a) to afford a compound of formula $(R^1)_p-A-(Z_t-X^1-N^1)_n$;

(c) reacting the product of step (b) with a second monomer N^2 , a dimer N^2-N^3 or a trimer $N^2-N^3-N^4$; and

(d) repeating steps (b) and (c) to produce an LPC-bound biopolymer of formula $(R^1)_p-A-(Z_t-X^1-N^1-N^2-...-N^m)_n$, where m is 3 to 100, wherein:

A is silicon; R^1 is hydrogen, alkyl, aryl, aralkyl, heteroaryl, heteroaralkyl, heterocyclyl or heterocyclalkyl; p is 0 or 1; Z is any combination of 0-12 units selected from 1,2-, 1,3- or 1,4-phenylene and alkylene, which units may be combined in any order; t is 0 or 1; X^1 is ~~any reactive group which can be used in biopolymer synthesis~~ any reactive group that effects biosynthesis of biopolymers; n is 3 or 4; with the proviso that if Z is methylene, then Z contains more than three methylene units; R^1 , X^1 , and Z are unsubstituted or substituted with one or more substituents each independently selected from Q; and Q is halogen, hydroxy, nitrile, nitro, formyl, mercapto, carboxy, alkyl, haloalkyl, polyhaloalkyl, aminoalkyl, diaminoalkyl, alkenyl containing 1 to 2 double bonds, alkynyl containing 1 to 2 triple bonds, cycloalkyl, cycloalkylalkyl, aryl, heteroaryl, arylalkyl, heteroarylalkyl, alkylidene, arylalkylidene, alkylcarbonyl, arylcarbonyl, heteroarylcarbonyl, alkoxycarbonyl, alkoxycarbonylalkyl, aryloxy carbonyl, aryloxy carbonylalkyl, aminocarbonyl, alkylaminocarbonyl,

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dialkylaminocarbonyl, arylaminocarbonyl, diarylamino carbonyl, arylalkylaminocarbonyl, alkoxy, aryloxy, perfluoroalkoxy, alkynyloxy, alkynyl, arylalkoxy, amino, aminoalkyl, alkylaminoalkyl, dialkylaminoalkyl, arylaminoalkyl, diarylaminoalkyl, alkylamino, dialkylamino, arylamino, diarylamino, alkylaryl amino, alkylcarbonylamino, alkoxycarbonylamino, arylcarbonylamino, aryloxycarbonylamino, azido, alkylthio, arylthio, perfluoroalkylthio, thiocyno, isothiocyno, alkylsulfinyl, alkylsulfonyl, arylsulfinyl, arylsulfonyl, aminosulfonyl, alkylaminosulfonyl, dialkylaminosulfonyl, arylaminosulfonyl or diarylamino sulfonyl; and

$N^1, N^2, N^3 \dots N^m$ are biopolymer monomers; and the dimers and trimers comprise the monomers.

34. (Previously presented) The method of claim 33, wherein the biopolymer is an oligonucleotide, peptide, peptide nucleic acid (PNA) or oligosaccharide.

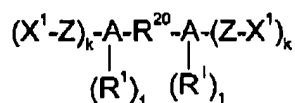
35. (Previously presented) The method of claim 33, further comprising the step of: (e) cleaving the biopolymer from the LPC.

36. (Previously presented) The method of claim 33, wherein the biopolymer is an oligonucleotide.

37. (Previously presented) The method of claim 33, wherein n is 3 or 4.

39. (Previously presented) The method of claim 33, wherein X^1 is OH, SH, NH_2 , COR^5 or $COOR^4$, where R^4 is selected from hydrogen, alkyl, aryl, aralkyl, heteroaryl, heteroaralkyl, heterocyclyl and heterocyclylalkyl; and R^5 is halide, heteroaryl or pseudohalide.

45. (Currently amended) A liquid phase carrier (LPC) that has formula:



wherein: A is silicon; R^1 is hydrogen, alkyl, aryl, aralkyl, heteroaryl, heteroaralkyl, heterocyclyl or heterocyclylalkyl; Z is any combination of 1-12 units selected from 1,2-, 1,3- or 1,4-phenylene and alkylene, which units may be combined in any order; t is 0 or 1; X^1 is any reactive group which can be used in biopolymer synthesis any reactive group that effects biosynthesis of biopolymers; R^1 , X^1 , and Z are unsubstituted or substituted with one or more substituents each independently selected from Q; and Q is halogen, hydroxy, nitrile, nitro,

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formyl, mercapto, carboxy, alkyl, haloalkyl, polyhaloalkyl, aminoalkyl, diaminoalkyl, alkenyl containing 1 to 2 double bonds, alkynyl containing 1 to 2 triple bonds, cycloalkyl, cycloalkylalkyl, aryl, heteroaryl, arylalkyl, heteroarylalkyl, alkylidene, arylalkylidene, alkylcarbonyl, arylcarbonyl, heteroarylcarbonyl, alkoxycarbonyl, alkoxycarbonylalkyl, aryloxy carbonyl, aryloxy carbonylalkyl, aminocarbonyl, alkylaminocarbonyl, dialkylamino carbonyl, arylaminocarbonyl, diarylamino carbonyl, arylalkylaminocarbonyl, alkoxy, aryloxy, perfluoroalkoxy, alkenyloxy, alkynyloxy, arylalkoxy, amino, aminoalkyl, alkylaminoalkyl, dialkylaminoalkyl, arylaminoalkyl, diarylaminoalkyl, alkylamino, dialkylamino, arylamino, diarylamino, alkylaryl amino, alkylcarbonylamino, alkoxycarbonylamino, arylcarbonylamino, aryloxy carbonylamino, azido, alkylthio, arylthio, perfluoroalkylthio, thiocyano, isothiocyano, alkylsulfinyl, alkylsulfonyl, arylsulfinyl, arylsulfonyl, aminosulfonyl, alkylaminosulfonyl, dialkylaminosulfonyl, arylaminosulfonyl or diarylamino sulfonyl; R²⁰ is alkylene, alkenylene, alkynylene, arylene or heteroarylene; k is 2 or 3; and j is 0 or 1.

49. (Previously presented) The LPC of claim 5 coupled to a biopolymer.